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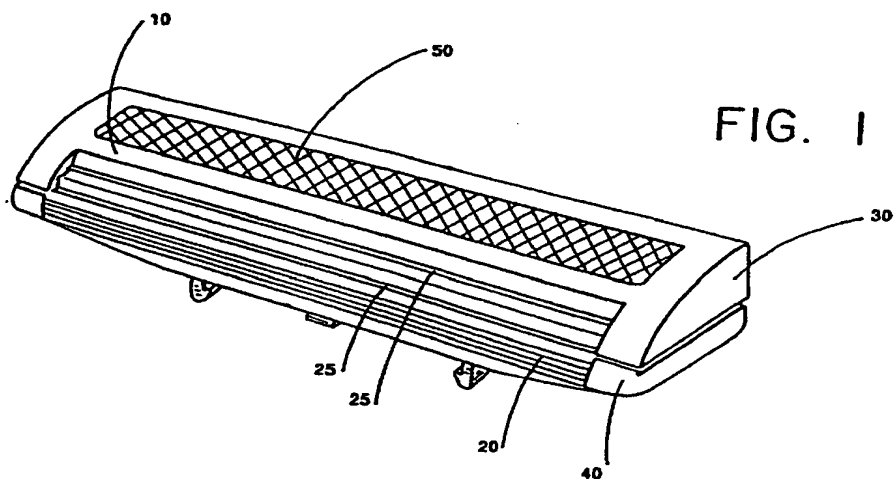
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**(54) Reduced friction razor head**

(57) Razor heads comprising at least one blade and a blade housing comprising a skin engaging surface having a static coefficient of friction not greater than 0.20. Also disclosed are shaving aids comprising a

water insoluble matrix comprising a material having a static coefficient of friction not greater than 0.20 and a water soluble active ingredient.



**FIG. 1**

## Description

The present invention is directed to wet shaving systems and, more particularly, to shaving systems comprising skin engaging surfaces and shaving aids having reduced friction.

## BACKGROUND OF THE INVENTION

One of the most important attributes of a shaving system is its ability to deliver a comfortable shave. Over the years, numerous suggestions have been proposed for improving the comfort of a shave. For example, U.S. Patent No. 4,170,821 to Booth discloses a shaving aid connected to a razor head wherein a water soluble active ingredient is released from an insoluble matrix during shaving. U.S. Patent No. 4,291,463 to Williams discloses a solid, water soluble lubricating shaving aid which is coated onto a razor blade. U.S. Patent No. 3,071,856 to Fischbein discloses blade edge coatings of polymeric materials such as polytetrafluoroethylene (PTFE), U.S. Patent No. 2,937,976 to Granaham discloses blade edge coatings comprising organosiloxanes and U.S. Patent No. 2,292,417 to Wetherby discloses blade coatings containing a wax and a surface-active material. More recently, U.S. Patent No. 4,914,817 to Galligan disclosed a razor cartridge having a surface with a plurality of "riblets" which could be formed in a variety of ways and were designed to reduce the friction between the skin of the user and the cap and guard surface of a razor cartridge.

Each of the above-mentioned attempts at providing a more comfortable shave required a razor manufacturer to perform additional processing steps or to add additional components to existing products. It would therefore be desirable to provide a wet shaving system which provides improved comfort without requiring a manufacturer to perform additional processing steps. It would further be desirable to provide a wet shaving system having improved comfort without requiring additional components.

Furthermore, previously disclosed shaving aids which incorporated a water-insoluble matrix and a water-soluble active ingredient lost that active ingredient during shaving. After repeated shaves, the skin surface being shaved could be contacted by the matrix material which typically had a higher coefficient of friction than the lubricous active ingredient. Contact of the matrix and the skin could result in a shave with less than optimum comfort.

It would therefore be desirable to provide a shaving aid which decreases the likelihood of a matrix having a high coefficient of friction with the skin surface being shaved.

## BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a perspective view of one embodiment

of the present invention.

## SUMMARY OF THE INVENTION

Various embodiments of the present invention comprise razor heads having a blade housing with a skin-engaging surface having a static coefficient of friction not greater than 0.20. The low-friction skin-engaging surfaces of the present invention are not subject to depletion of active ingredients after repeated shaves in the same manner as the water-soluble active ingredients disclosed in the above-referenced patent to Booth. In systems utilizing such water-soluble active components, over the course of repeated shaves, the amount of water-soluble material delivered to the skin's surface can be reduced thereby diminishing the benefit to the shaver. During subsequent shaves, a consumer is more likely to come in contact with the higher friction water-insoluble matrix.

Another aspect of the present invention comprises a shaving aid with a water-insoluble matrix formed of a material having reduced friction.

According to a further embodiment of the present invention, a razor head has a blade housing with a skin-engaging surface having a static coefficient of friction not greater than 0.20 and a shaving aid.

## DETAILED DESCRIPTION

Various embodiments of the present invention provide razor heads having surface areas with reduced friction in order to provide a more comfortable shave. According to various embodiments of the present invention, razor heads comprise a skin-engaging surface having a static coefficient of friction which is not greater than 0.20, preferably not greater than 0.16, and most preferably less than 0.10 when measured at 40 psi and ambient temperature. The low friction skin-engaging surface is preferably provided on a cap member, guard element and/or the skin-engaging portions of sidewalls.

One embodiment of the present invention is in the form of a razor head, illustrated in Figure 1, and comprises a cap 10, guard element 20, blades 25, upper side walls 30, base 40 and shaving aid 50. In this illustrated embodiment cap member 10, guard 20 and the upper skin-engaging side wall portions 30 are formed of a low-friction material. These low friction materials have a static coefficient of friction which is not greater than 0.20, preferably not greater than 0.16, and most preferably less than 0.10 when measured at 40 psi and ambient temperature. Since some low-friction materials are more costly than thermoplastics commonly used in the blade housings of razor heads, in this illustrated embodiment the base 40 is formed of a less expensive material, e.g. polypropylene or polystyrene, which have a higher coefficient of friction. These materials typically have static coefficient of friction which are greater than 0.25 when measured under the same conditions. The

higher coefficient of friction base 40 facilitates handling while loading and unloading the cartridge onto a razor and can also help to maintain the cartridge on the razor during shaving. The use of a different material is not required, however, in order to obtain the advantages of the present invention. Those skilled in the art will appreciate that it is most preferable to utilize materials that are chemically compatible when different materials are being used. Therefore, if a base having a higher coefficient of friction is being sequentially molded with a lower coefficient of friction cap member, the materials will preferably exhibit suitable chemical compatibility to form any needed bonds. If the shaving elements are being formed separately and subsequently connected using an adhesive or mechanical anchors, then chemical compatibility is less important.

The advantages of the present invention are applicable to all razor heads. As used herein, the term "razor head" is intended to include shaving cartridges designed for attachment to a separate razor, as well as the operative skin-engaging portion of a shaving system wherein a handle is integrally formed with the blade support structure.

It is also within the scope of the present invention to utilize more than one low-friction material in a single razor head. For example, a cap member can be formed of a first low-friction material and a guard element can be formed of a different low-friction material in order to optimize the comfort of a shave.

According to another aspect of the present invention, a shaving aid is formed of a water-insoluble low-friction matrix and a water-soluble active ingredient which is exuded from the shaving aid during shaving. The use of a low-friction water-insoluble matrix is designed to provide a longer lasting comfortable shave life to the razor head even after the water-soluble component(s) has been substantially depleted. Therefore, by utilizing a low-friction water-insoluble matrix, the loss of active ingredient, e.g. friction-reducing water-soluble active ingredient, in a shaving aid can be offset by the reduced friction characteristics of the matrix. Furthermore, the reduced friction attribute of the matrix complements the water-soluble component resulting in an overall lower friction component than is currently available. The use of a low friction water-insoluble matrix may advantageously permit more of the water-soluble material to exude during shaving, thereby increasing the efficiency of the delivery of the water-soluble component(s).

From the present description, those skilled in the art will be able to determine numerous suitable low-friction thermoplastic materials having a coefficient of static friction in the desired range. As used herein, the term "low friction materials" is used to indicate materials having a static coefficient of friction which is not greater than 0.20 when measured at 40 psi and ambient temperature. Preferred low friction materials have static coefficients of friction which are not greater than 0.16

and most preferred low friction materials have coefficients of friction less than 0.10. Examples of suitable thermoplastic materials include both crystalline and amorphous engineering thermoplastics, particularly those employing lubricating agents such as PTFE, silicone, other lubricating agents, either alone or in combination. Specific commercially available compounds include thermoplastics sold under the trademarks Plaslube™ and Electrafil™ available from DSM Engineering Plastics of Reading, Pennsylvania, such as Plaslube PC-50/TF/13/SI/2, Electrafil J50/CF/10/TF/13/SI/2, Plaslube PC-50/TF/10/PL, Plaslube J50/20/SI/2. From the present description, those skilled in the art may also identify other suitable materials.

A number of different materials have been suggested for use as shaving aids. The term "shaving aid," as used herein, refers to the active ingredient combined within a delivery system, such as a water-insoluble micro-porous matrix structure. Previously suggested active ingredients include those disclosed in U.S. Patent No. 4,170,821 to Booth, which is hereby incorporated by reference. A shaving aid may comprise one or various combinations of the following:

A. A lubricating agent for reducing the frictional forces between the razor and the skin, e.g., a micro-encapsulated silicone oil.

B. An agent which reduces the drag between the razor parts and the shaver's face, e.g., a polyethylene oxide in the range of molecular weights between 100,000 and 6,000,000; a non-ionic polyacrylamide; and/or a natural polysaccharide derived from plant materials such as "guar gum."

C. An agent which modifies the chemical structure of the hair to allow the razor blade to pass through the whiskers very easily, e.g., a depilatory agent is one example.

D. A cleaning agent which allows the whisker and skin debris to be washed more easily from the razor parts during shaving, e.g., a silicon polyethylene oxide block copolymer and detergent such as sodium lauryl sulphate.

E. A medicinal agent for killing bacteria, or repairing skin damage and abrasions.

F. A cosmetic agent for softening, smoothing, conditioning or improving the skin.

G. A blood coagulant for the suppression of bleeding that occurs from nicks and cuts.

H. An astringent for constricting blood vessels thereby stemming the flow of bodily fluids such as lymph, which may exude from skin which has been irritated during shaving.

Alternatively, the shaving aid may comprise one or more of the shaving aids disclosed in U.S. Patent No. 5,056,221 to Thoene, U.S. Patent No. 4,044,120 to Rowsell et al., U.S. Patent No. 5,095,619 to Davis et al., or Japanese Patent Application No. Hei 7 [1995] -

24156 to Miyazaki, et al. which are also hereby incorporated by reference.

Other active ingredients may include various pigments, e.g., titanium dioxide, fragrances, aloe vera, flavoring agents, mineral oils, essential oils and other oils derived from plants. In addition to one or more active ingredients, the shaving aids of the present invention may also comprise other compounds or blends of compounds such as water-insoluble polymers such as polystyrene and polypropylene.

#### Claims

1. A razor head comprising at least one blade and a blade housing comprising a skin engaging surface having a static coefficient of friction not greater than 0.20.

2. A razor head according to claim 1 wherein said skin engaging surface has a static coefficient of friction not greater than 0.16.

3. A razor head according to claim 1 wherein said skin engaging surface has a static coefficient of friction less than 0.10.

4. A razor head according to claim 1 wherein said skin engaging surface is formed of a thermoplastic material comprising a lubricating agent selected from the group consisting of PTFE, silicone, and blends thereof.

5. A razor head according to claim 1 wherein said skin engaging surface is formed of a thermoplastic material comprising PTFE and silicone.

6. A razor head according to claim 1 further comprising a shaving aid comprising at least one material selected from the group consisting of a lubricating agent, a medicinal agent, a vitamin, a cosmetic agent, a coagulant, an astringent, a cleaning agent, a skin conditioner, and blends thereof.

7. A razor head according to claim 1 wherein a non-skin engaging portion of said blade housing comprises a material having a static coefficient of friction greater than 0.25.

8. A razor head according to claim 1 wherein said blade housing comprises at least two different low friction skin engaging portions which each have a static coefficient of friction not greater than 0.20.

9. A razor head comprising at least one blade;

a blade support comprising a skin engaging surface;

a shaving aid connected to said blade housing;

wherein said skin engaging surface of said blade support has a static coefficient of friction not greater than 0.20.

10. A razor head according to claim 9 wherein said skin engaging surface has a static coefficient of friction not greater than 0.16.

11. A razor head according to claim 9 wherein said skin engaging surface has a static coefficient of friction less than 0.10.

12. A razor head according to claim 9 wherein said skin engaging surface is formed of a thermoplastic material comprising a lubricating agent selected from the group consisting of PTFE, silicone, and blends thereof.

13. A razor head according to claim 9 wherein said skin engaging surface is formed of a thermoplastic material comprising PTFE and silicone.

14. A razor head according to claim 13 wherein said shaving aid comprises a material selected from the group consisting of a lubricating agent, a medicinal agent, a vitamin, a cosmetic agent, a coagulant, an astringent, a cleaning agent, a skin conditioner, and blends thereof.

15. A razor head according to claim 9 wherein said shaving aid comprises a material selected from the group consisting of a lubricating agent, a medicinal agent, a vitamin, a cosmetic agent, a coagulant, an astringent, a cleaning agent, a skin conditioner, and blends thereof.

16. A razor head according to claim 9 wherein a non-skin engaging portion of said blade housing comprises a material having a static coefficient of friction greater than 0.25.

17. A razor head comprising at least one blade and a shaving aid, said shaving aid comprising a water insoluble matrix comprising a material having a static coefficient of friction not greater than 0.20 and a water soluble active ingredient.

18. A razor head according to claim 17 wherein said matrix material has a static coefficient of friction not greater than 0.16.

19. A razor head according to claim 18 wherein said matrix material has a static coefficient of friction less than 0.10.

20. A razor head according to claim 17 wherein said matrix material is formed of a thermoplastic material comprising a lubricating agent selected from the

group consisting of PTFE, silicone, and blends thereof.

21. A razor head according to claim 17 wherein said matrix material is formed of a thermoplastic material selected from the group consisting of PTFE, silicone, and blends thereof. 5

22. A razor head according to claim 17 wherein said active ingredient is selected from the group consisting of a lubricating agent, a medicinal agent, a vitamin, a cosmetic agent, a coagulant, an astringent, a cleaning agent, a skin conditioner, and blends thereof. 10

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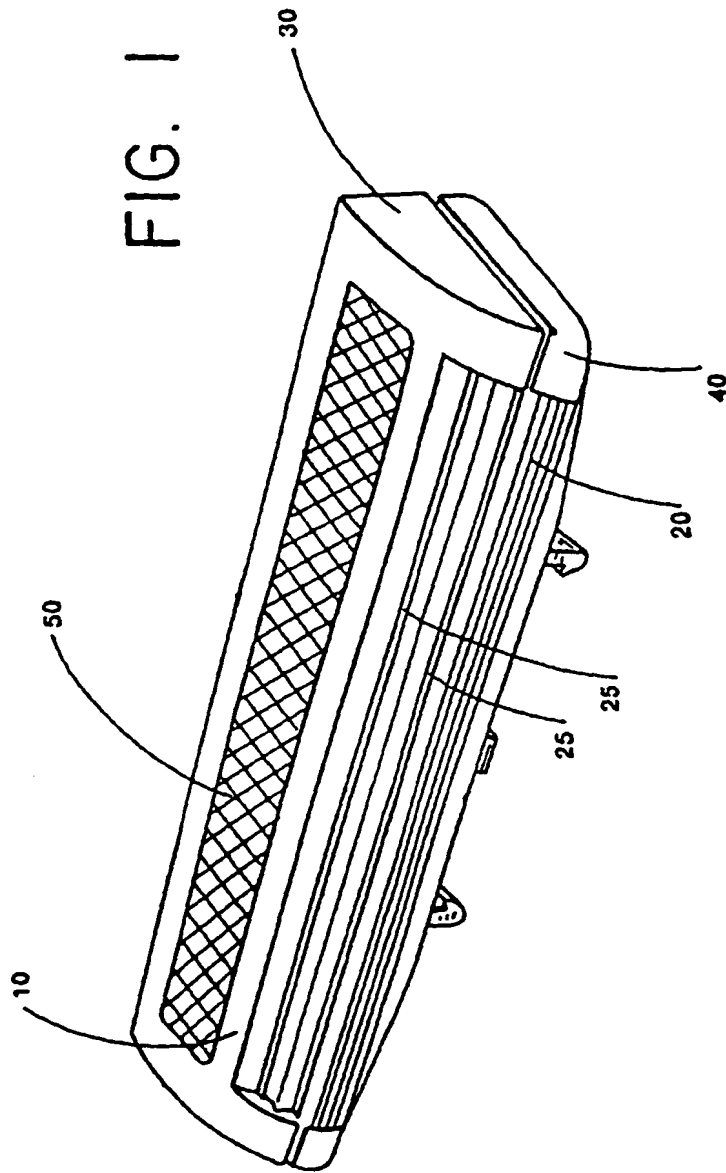
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# EUROPEAN SEARCH REPORT

Application Number  
EP 98 10 0720

| DOCUMENTS CONSIDERED TO BE RELEVANT  |   |  |  |
|--|---|--|--|
| Category   | Citation of document with indication, where appropriate, of relevant passages                             | Relevant to claim  | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X  | US 4 875 287 A (CREASY WALTER S ET AL)<br><br>* column 4, line 35 - column 8, line 8;<br>figures 1,2 *    | 1-3,<br>9-11,<br>17-19                                   | B26B21/40<br>B26B21/44                       |
| Y  | ---   | 4,5,12,<br>13,20,21                                      |  |
| X  | US 5 001 832 A (ALTHAUS WOLFGANG)<br>* column 1, line 54 - column 2, line 34 *                            | 1-3,8-11   |  |
| X  | US 4 872 263 A (ETHEREDGE ROBERT W III ET AL)<br>* column 4, line 1 - column 6, line 60;<br>figures 1,2 * | 1-3,6,<br>9-11,15  |  |
| Y  | ---   | 14,22  |  |
| Y  | GB 2 183 523 A (WILKINSON SWORD LTD)<br><br>* the whole document *  | 4,5,<br>12-14,<br>20-22                                  |  |
|  |   |  | TECHNICAL FIELDS SEARCHED (Int.Cl.6)         |
|  |   |  | B26B   |
| The present search report has been drawn up for all claims   |   |  |  |
| Place of search<br><b>THE HAGUE</b>  |   | Date of completion of the search<br><b>20 April 1998</b> | Examiner<br><b>Herygers, J</b>               |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/> Y : particularly relevant if combined with another document of the same category<br/> A : technological background<br/> O : non-written disclosure<br/> P : intermediate document</p> <p>T : theory or principle underlying the invention<br/> E : earlier patent document, but published on, or after the filing date<br/> D : document cited in the application<br/> L : document cited for other reasons<br/> &amp; : member of the same patent family, corresponding document</p> |   |  |  |

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